> more other components of the distributed system of optimizing a protocol, the protocol being employed by the first component and the other component in making the transaction, the first component being a coordinator for the protocol, and
> the method comprising the steps of:
> receiving an augmented one of the messages (401) from the other component, the other component having augmented the message by adding protocol state information (405) to the message, the protocol state information indicating a state of the other component that is relevant to the protocol;
> retaining the state of the other component indicated in the augmented message (413); and
> using the retained state to optimize the protocol.

This rejection is based on the recently-issued *Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility*. According to Examiner, claim 11 is not addressed to patentable subject matter because "it lacks 'real world value' because there is no final result" (Office action of 2/28/07, p. 2, par. 5). The first problem with the rejection is that Examiner misstates the test set forth in the *Interim Guidelines*. It is not whether an invention "possess[es] a certain level of 'real world' value" (Office action of 2/28/07, p. 2, par. 4), but rather "whether a claim provides a practical application that produces a useful, tangible, and concrete result" (*Interim Guidelines*, page 11, second paragraph).

The "final result" of claim 11 is clearly the optimization of a "protocol [that is] employed by the first component and the other component in making a transaction". The claim is generic; the protocol may be any protocol which fits the claim language. One example of such a protocol is the 2-phase commit protocol. "optimization" is used in the claim and in Applicants' Specification in its standard technical meaning:

> In computing, **optimization** is the process of modifying a system to make some aspect of it work more efficiently or use fewer resources. (Wikipedia)

Clearly, the optimization of a protocol is a useful result: the optimized protocol uses fewer resources than the unoptimized protocol. It is further a tangible result: whether a protocol has been optimized can be determined by comparing the behavior of the unoptimized protocol with the optimized protocol; finally, the optimization is a concrete result: both the reduced use of resources and the difference in behavior resulting from the optimization are measurable. Because the result of claim 11 is "useful, tangible, and concrete", the claim is addressed to patentable subject matter.

Examiner goes on to object that "protocol" may be used in many ways and that "augmenting a message by adding protocol state information" does not comply with the art accepted definition of "protocol". These objections, however, have no place in a rejection under 35 U.S.C. 101. If they are taken to be rejections under 35 U.S.C. 112, 2. par., Applicants' attorney responds that Examiner defines "protocol" as a "set of rules or standards designed to enable computers to connect with one another and to exchange information with as little error as possible", and that such a definition by no means excludes optimizing a protocol that is employed in a transaction by augmenting a message belonging to the transaction, as set forth in the claim.

The rejections of the claims under 35 U.S.C. 102 as anticipated by Lampson

A rejection of the claims under 35 U.S.C. 102 as anticipated by Lampson was appealed by Applicants. Applicants' *Appeal Brief* filed June 15, 2006, successfully traversed the rejection. Included in the traversal was a demonstration that Lampson did not disclose the "augmented messages [belonging to a transaction]" (claim 11, lines 2 and 8) of Applicants' claims, and when prosecution was reopened, Examiner accepted the demonstration and rejected the claims under 35 U.S.C. 103 as obvious over the combination of Lampson and Ruberg, with Ruberg being cited as disclosing the "augmented messages" that were lacking in Lampson. Applicants traversed the rejection under 35 U.S.C. 103 by demonstrating that Ruberg did not disclose the "augmented messages". Thereupon, Examiner reverted to his prior opinion that Lampson discloses the augmented messages. Applicants are traversing the rejections by once again demonstrating that Lampson does not disclose the augmented messages of the claims and consequently does not anticipate the claims.

On reading Examiner's new arguments for the rejection under 35 U.S.C. 103, it is apparent that Examiner does not understand that the "messages belonging to a transaction" (claim 11, line 2) are *not* messages belonging to the "protocol [that is] employed by the first component and the other component in making the transaction" (claim 11, lines 4 and 5). A "transaction" here is an action that, if performed by the cohort, changes the state of the cohort. For example, a simple transaction may be an update of data contained in the cohort. The "messages belonging to the transaction" would include at least a message from the coordinator to the cohort which indicates that the data is to be updated and the new value and a message from the cohort to the coordinator indicating that the update message had been received. These *transaction messages* are *separate from* the messages belonging to the ""protocol [that is} employed by the first component and the

other component in making the transaction". The purpose of the "protocol" is to ensure that the cohorts that can be changed by the messages belonging to a transaction are either *all* changed by the transaction or *none of them* is changed by it, i.e., there is no inconsistency among the cohorts with regard to the transaction. See in this regard the discussion of the prior-art two-phase commit protocol beginning at page 15, line 15 of Applicants' Specification.

Protocol messages in the prior-art two-phase commit protocol

As is clear from the discussion of the prior-art two-phase commit protocol, in the prior-art protocol, the messages of the protocol are separate from the messages of the transaction. See page 16, beginning at line 15. When the coordinator receives a transaction message that indicates the end of the transaction, the coordinator sends a *commit request* message belonging to the protocol to each of the cohorts; if a cohort can commit the transaction, it responds to the commit request with an *agree* message belonging to the protocol; if the coordinator receives an *agree* message from each of the cohorts, it sends a *commit* message belonging to the protocol to each of the cohorts; each cohort responds by committing the transaction and sending an *acknowledgment* message belonging to the protocol to the cohort. When the coordinator has received acknowledgments from all of the cohorts, the coordinator commits the transaction. If a cohort cannot commit the transaction, it sends an *abort* message belonging to the protocol to the coordinator, and if the coordinator receives an *abort* message from any cohort, it sends *abort* messages to all of the cohorts. The cohorts respond to the *abort* message by undoing the transaction. As is apparent from the foregoing, the prior-art two-stage commit protocol does not use the messages of the transaction to carry information about the state of the coordinator or the cohorts *with regard to the two-phase commit protocol.*

Protocol messages in Lampson

Lampson optimizes the two-phase commit protocol described above by taking advantage of the fact that when the coordinator knows that a cohort is *read only* with regard to a given transaction, there is no need for the coordinator to send a *commit* message to the read only cohort or the for the read-only cohort to send an *acknowledgment* message to the coordinator. See Lampson, FIG. 12 and col. 9, line 58-col. 10, line 6. In Lampson's optimization, when a cohort is read only with regard to the transaction, it responds to the *commit request* message with what Lampson terms a "read vote". This "read vote" is a protocol message which tells the coordinator that the cohort is read only with regard to the transaction, and once the coordinator knows that, it

need not send the *commit* protocol message to the cohort and the cohort need not send the *acknowledge* protocol message. Like the messages of the standard two-phase commit protocol, the "read vote" is a separate message; it is not carried in the transaction messages

Applicants' invention

Applicants' invention as applied to the two-phase commit protocol further optimizes the two-phase commit protocol by noting that if the coordinator knows *at the time it sends the commit request for a transaction* that a cohort is read only with regard to the transaction, it need not send the commit request to the transaction and the cohort need not respond to the commit request. In Applicants' method, when the coordinator knows that a cohort is read only with regard to the transaction, it sends an *abort* protocol message to the cohort instead of the *commit request* protocol message; the read-only cohort responds to the *abort* message by doing nothing.

The method Applicants' invention uses to keep the coordinator informed as to whether a cohort is read-only with regard to a transaction is to *augment* the transaction messages sent by the cohort to the coordinator with protocol state that indicates whether the cohort is read only or read-write. The coordinator retains the last protocol state it received for the transaction in and augmented transaction message from the cohort and uses it to determine whether to send a *commit request* protocol message or an *abort* protocol message to the cohort. FIG. 4 shows the augmented transaction messages are shown at 403 and the retained state at 413; the flowchart of FIG. 5 shows how the augmented messages are received in the coordinator and used to determine what messages are sent to the cohorts. As is apparent from the foregoing, the use of augmented transaction messages in the two-phase commit protocol reduces the protocol messages between the coordinator and the read-only cohort to the single *abort* message from the coordinator to the cohort, as opposed to Lampson's *commit request* message from the coordinator to the read-only cohort and the cohort's "read vote" reply to the coordinator.

As pointed out at page 21, line 16-page 27, line 9, the disclosed technique of using augmented transaction messages to optimize the two-phase commit protocol is general and may be used in any situation in which knowledge of the current state of the cohort with regard to a protocol makes it possible for the coordinator to optimize the protocol. Claim 11 is a generic claim to the general technique of using augmented transaction messages to optimize a protocol.

Patentability of Applicants' claims over Lampson

As set forth in great detail in the preceding, Lampson's optimization of the two-phase commit protocol does not involve an"augmented one of the messages [belonging to a transaction]" which has been augmented by "adding protocol state information to the message", as set forth at lines 7 and 8 of claim 11 or "retained state" which is the state "indicated in the augmented message (lines 13-15 of the claim). Lampson consequently does not disclose these limitations of claim 11 and claim 11 is patentable over Lampson. Independent claims 9, 10, 22, 26, and 30 include these same limitations and are patentable over Lampson for the same reasons that claim 11 is patentable over Lampson.

Conclusion

Applicants have traversed all of Examiner's grounds of rejection and have consequently been fully responsive to Examiner's non-final Office action of 2/28/07 as required by 37 C.F.R. 1.111(b) and respectfully request that Examiner continue with his examination and allow the claims as amended, as provided by 37 C.F.R. 1.111(a). No fees are believed to be required for this response. Should any be, please charge them to Deposit Account Number 501315.

Respectfully submitted,

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5/28/07
Date